
Implications for Prevention

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Objectives: To assess incidence rates of eye injuries in the US Armed Forces and to identify demographic and occupational correlates of risk.

Design: Retrospective population-based study.

Setting: US military medical facilities worldwide.

Participants: All individuals in the US Armed Forces during 1998.

Main Outcome Measures: Incidence rates of hospitalizations and ambulatory visits for eye injuries.

Results: The incidence rate of ambulatory visits (983 per 100000 person-years) for eye injuries was 58 times higher than the incidence rate of hospitalizations (17 per 100000 person-years) for eye injuries. Orbital floor fractures, contusions, and open wounds to the ocular adnexa and orbit accounted for 85% of eye injuries resulting in hospitalization, while 80% of ambulatory visits were for superficial wounds and foreign bodies. Hospitalization rates varied widely across demographic subgroups. Men had twice the incidence rate as women, and the youngest age group (17-24 years) had 6 times the incidence rate of the oldest age group (35-65 years). Together, motor vehicle crashes and fights caused nearly half of the hospitalizations. Ambulatory rates varied significantly in relation to occupation but not to demography. Tradespeople (eg, metal body machinist, welder, and metalworker) had incidence rates 3 to 4 times higher than the overall population rate.

Conclusions: Hospitalization and ambulatory data provide different views of the morbidity associated with eye injuries. General safety precautions and behavior modification, rather than eye-specific interventions, are indicated to prevent the most serious eye injuries. However, the consistent use of eye protection during known hazardous occupational activities could prevent much of the morbidity associated with the less serious, yet more common, eye injuries.


Eye injuries range from minor bruises and scratches to serious lacerations, fractures, and burns. Although eye injuries are considered an important cause of morbidity, there have been few epidemiological studies that have described the complete spectrum and incidence of eye injuries in an adult population. Most epidemiological studies of eye injuries have been narrowly focused on specific types of injuries, exposures, or settings. Also, they have been based on self-reported data, which may be unreliable, or on hospitalization, emergency department, or registry records, which only capture a subset of all eye injuries.

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RESULTS

GENERAL

The surveillance population of 1.6 million active duty military personnel was observed for 1.4 million person-years during 1998. During this study period,
there were 13664 ambulatory visits (983 per 100000 person-years) for eye injuries and 237 hospitalizations (17 per 100000 person-years) and eye injuries. Orbital floor fractures (30%), contusions (28%), and open wounds to ocular adnexa and orbit (27%) were diagnoses for nearly 80% of the hospitalizations. In comparison, superficial injuries (52%) and foreign bodies in the eye (27%) were diagnoses for nearly 80% of the ambulatory visits.

DEMOGRAPHICS

Incidence rates of hospitalizations varied widely across demographic subgroups. Men had twice the incidence rate of women; the youngest age group (17-24 years) had 6 times the incidence rate of the oldest age group (35-65 years); and the least educated personnel (high school diploma) had 5 times the incidence rate of the most educated (college degree) (Table 1). In comparison, incidence rates of ambulatory visits did not significantly vary in relation to demographic factors. The incidence rates were slightly higher among women, the youngest age group, and those with some college compared with their demographic counterparts.

CAUSES OF HOSPITALIZED CASES

Together, motor vehicle crashes (23%) and fights (21%) caused nearly half of the hospitalizations for eye injuries (Table 2). Other major causes (≥10% each) were machinery or tools, athletics, and falls. Fights were the leading cause of hospitalizations for eye injuries among men, the youngest age group, and those with the least educational attainment.
Within the 234 occupational specialties, the most ambulatory visits for eye injuries occurred in the largest occupational groups (Table 3). The 3 occupations with the most ambulatory visits were infantry, aircraft repair, and trainees. In contrast, the 10 occupations with the highest incidence rates of ambulatory visits were all trades with inherent exposures to small, projectile objects, such as metal or wood. The 3 occupations with the highest incidence rates, metal body repair, welding, and metalworking, had rates 3 to 4 times higher than the overall population rate. Automotive repair workers were the only occupational group among the top 10 in both number (450 visits) and rate (1853 per 100000 person-years) of ambulatory visits.

Similar to ambulatory visits, the most hospitalizations for eye injuries occurred in the largest occupational groups. However, unlike ambulatory visits, the highest hospitalization rates also occurred in the largest occupational groups. For example, infantry, the largest occupational group, experienced the most hospitalizations (n=26) and had the highest incidence rate (35.8 per 100000 person-years) as well.

In 1998, approximately 1% of all members of the US Armed Forces were treated for eye injuries. The hospitalization and ambulatory visit incidence rates document...
In this study, the more serious eye injuries that required hospital care tended to result from nonmilitary motor vehicle crashes and fights. Recent studies in nonmilitary settings have also found that motor vehicle crashes and assaults were leading causes of eye injury-related hospitalizations. In addition, recent surveys have documented that physical fighting is common among US adolescents, and that male sex, a history of fighting, and alcohol use were related to physical fighting and associated injury risk. Because US military personnel are predominantly young men who volunteer to be trained and to fight as “warriors,” it is not surprising that physical fighting and associated injuries are relatively common among military personnel. These findings suggest that, at least during peacetime, serious eye injuries of military personnel may be more related to “leisure time” than to military or occupation-specific activities. Therefore, in the absence of more detailed information regarding injury-related circumstances and settings, general safety precautions and behavior modification initiatives (eg, driving safety, seat belt use, alcohol use, interpersonal violence prevention, and stress control) appear to be more appropriate than eye injury-specific interventions.

In contrast to hospitalizations, eye injuries treated in ambulatory settings were more common but less serious in nature. Ambulatory incidence rates for eye injuries were highest among inherently hazardous occupations (eg, metal body repair, welding, metalworking, machinist, and dental laboratory). Therefore, a high proportion of all eye injuries in the military could be prevented by the consistent use of protective equipment by personnel working in these trades. Strict adherence to eye protection guidelines by workers and strict enforcement by supervisors is indicated. Moreover, because skilled military workers often pursue their trades on their own time, training should emphasize the importance of using eye protection during those times as well.

In summary, eye injuries are an important source of morbidity among military personnel. Hospitalization and ambulatory data provide different views of the morbidity associated with eye injuries. Because hospital-treated eye injuries were mostly related to motor vehicle crashes and fighting, general safety precautions and behavior modification, rather than eye-specific interventions, will have the greatest impact in preventing these injuries. In contrast, eye injuries treated in an ambulatory setting were mostly related to inherently hazardous occupational activities. Therefore, the consistent use of eye protection during such activities could significantly prevent a high proportion of all eye injuries among the targeted high-risk occupational groups. Finally, because our findings were similar to those in nonmilitary populations and settings, they may be generalizable to other healthy adult populations.
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The opinions or assertions herein are the private views of the authors and should not be construed as official or as reflecting the views of the US Department of Defense or the Department of the Army.

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